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IS 3080 (1965): Test chart for universal tool and cutter grinders [PGD 3: Machine Tools]



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IS 3080 : 1965

(Reaffirmed 2001)

Indian Standard

**TEST CHART FOR UNIVERSAL
TOOL AND CUTTER GRINDERS**

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BUREAU OF INDIAN STANDARDS

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

NEW DELHI 110002

Gr 3

June 1965

*Indian Standard***TEST CHART FOR UNIVERSAL
TOOL AND CUTTER GRINDERS**

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*Indian Standard*TEST CHART FOR UNIVERSAL
TOOL AND CUTTER GRINDERS**0. FOREWORD**

0.1 This Indian Standard was adopted by the Indian Standards Institution on 12 March 1965, after the draft finalized by the Machine Tools Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 The manufacture of machine tools in India started during the last world war when the Government of India provided considerable assistance to the machine tool manufacturers not only by way of providing free inspection facilities but also in a number of other ways including a certain amount of guidance on manufacturing techniques. The interest of the Government of India in the development of the machine tools industry continued after the world war and the Inspection Wing of the Directorate General of Supplies and Disposals continued to provide free inspection facilities to all the interested machine tool manufacturers and issues test certificates in accordance with their existing requirements for grading of machine tools. The quality of the machine tools in general and of tool and cutter grinders in particular has considerably improved during the last few years. After taking into consideration the manufacturing practices prevalent in the country and in particular with the better organized manufacturers; the Sectional Committee decided to recognize limits of accuracy as detailed in this standard. It is hoped that within a short time a much larger number of manufacturers would be able to supply freely tool and cutter grinders complying with the requirements of this standard with the assistance which, it is hoped, the Government of India will organize for the benefit of interested manufacturers.

0.3 In preparing this standard, assistance has been derived from the book 'Testing Machine Tools', 6th ed. by G. Schlesinger published by the Machinery Publishing Company Limited, London, 1961.

0.4 The test chart has been so prepared as to provide a convenient basis for the preparation of a proforma for preparing test certificate.

0.5 For the correct interpretation of the results, it is necessary to lay down specifications for measuring instruments, like straightedges, mandrels with taper shanks, mandrels between centres and dial gauges. Mandrels between centres and mandrels with taper shanks have been covered

in IS:2063-1962*. The Engineering Metrology Sectional Committee, EDC 43, has already prepared the following specifications for measuring instruments:

IS : 2092-1962 Dial gauges

†IS : 2103-1962 Engineers squares

IS : 2220-1962 Steel straightedges

†IS : 2285-1963 Cast iron surface plates

†IS : 2554-1963 Cast iron angle plates

0.5.1 As decided by the Engineering Metrology Sectional Committee, EDC 43, the measuring instrument shall be calibrated at 20°C.

0.6 For the installation of the machines before testing, warming up of spindles and other moving parts, description of measuring methods and recommended precision concerning testing equipment, a reference shall be made to IS : 2063-1962*.

0.7 The sequence in which the tests have been given in the standard is not obligatory. If necessary, the sequence may be changed to suit the convenience of the inspector.

0.8 Practical tests for checking working accuracy should be carried out with the finishing cuts and not with the roughing cuts which are liable to generate large cutting forces.

0.9 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the limits of accuracies for universal tool and cutter grinders.

2. TESTING INSTRUMENTS

2.1 The testing instruments shall be of the approved type and shall be calibrated at 20°C (see 0.5.1).

*Code for testing machine tools.

†Since revised.

‡Rules for rounding off numerical values (revised).

3. ACCURACY REQUIREMENTS

3.1 The tests to be carried out, the maximum permissible errors, the instruments required and the manner of carrying out the tests shall be as detailed in the test chart (*see* page 6).

3.2 The tests shall be carried out at the manufacturer's works.

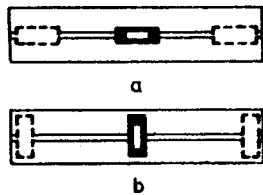
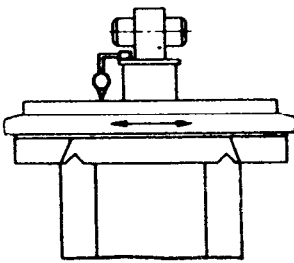
3.3 Before carrying out the tests, the machines shall be levelled in accordance with the manufacturer's instructions, which should be supplied in sufficient detail with each machine.

TEST CHART FOR UNIVERSAL TOOL AND CUTTER GRINDER

Type Order No. Customer

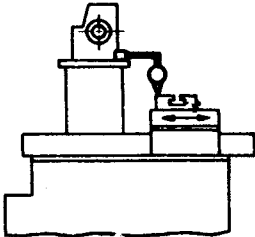
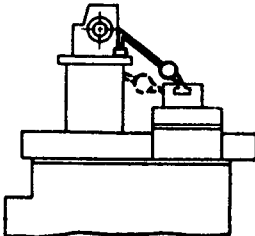
Machine No. Date Inspector

IS 3080 : 1965

SL No.	TEST	FIGURE	MEASURING INSTRUMENTS	PERMISSIBLE ERROR IN mm	ACTUAL ERROR IN mm	INSTRUCTIONS FOR TESTING
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Flatness of the table: a) In longitudinal direction b) In transverse direction	 a b	Spirit level with sensitivity 0.03 to 0.05 mm/m	a) $\pm 0.04/1\ 000\text{ mm}$ b) $0.04/1\ 000\text{ mm}$	...	Table in middle position, spirit level placed on the table in longitudinal and transverse directions in centre and at both ends and readings noted.
2	Parallelism of the longitudinal movement of the table with the clamping surface of the table		Dial indicator	0.02/300 mm	...	Dial indicator mounted as shown in the figure with its feeler scanning the clamping surface of table. Table moved longitudinally in both directions and readings noted.

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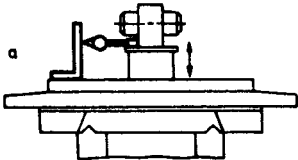
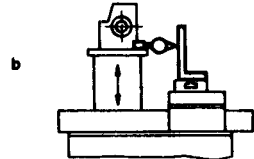
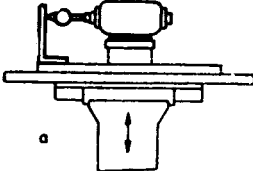
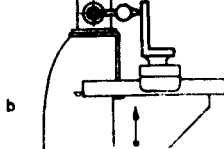
TEST CHART FOR UNIVERSAL TOOL AND CUTTER GRINDER — *Contd*

SL No.	TEST	FIGURE	MEASURING INSTRUMENTS	PERMISSIBLE ERROR IN mm	ACTUAL ERROR IN mm	INSTRUCTIONS FOR TESTING
(1)	(2)	(3)	(4)	(5)	(6)	(7)
3	Transverse movement of the table parallel with the clamping surface of the table		Dial indicator	0.01/100 mm	...	Dial indicator mounted as shown in the figure with its feeler scanning the clamping surface of the table. Table moved transversely and readings noted.
4	Parallelism of the fixing slot of the clamping surface to the longitudinal movement of the table		Dial indicator	0.02/300 mm travel of the table	...	Indicator feeler scanning the T-slot as shown in the figure. Table moved longitudinally and readings noted.

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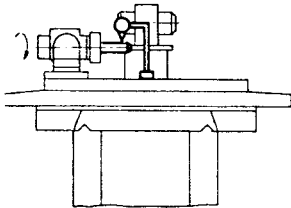
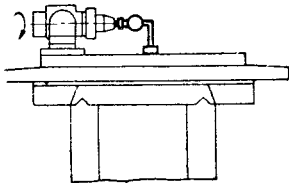
TEST CHART FOR UNIVERSAL TOOL AND CUTTER GRINDER — *Contd*

IS 3080 : 1965

Sl. No.	TEST	FIGURE	MEASURING INSTRUMENTS	PERMISSIBLE ERROR IN mm	ACTUAL ERROR IN mm	INSTRUCTIONS FOR TESTING
(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	Squareness of the vertical movement of grinding head with the clamping surface: a) In plane through longitudinal axis of the table b) Perpendicular to the plane at (a)	 a  b	Engineer's square, dial indicator	a) 0.03 / 100 mm travel b) 0.03 / 100 mm travel	...	Dial indicator mounted as shown in the figures with its feeler scanning the square which is fixed on the clamping surface of the table. Move the grinding head upwards and downwards and note the readings.
6	Squareness of the vertical movement of table with its clamping surface: a) In a plane through the longitudinal axis of the table b) In a plane perpendicular to the plane at (a)	 a  b	Engineer's square, dial indicator	a) 0.03 / 100 mm travel b) 0.03 / 100 mm travel	...	Dial indicator mounted as shown in the figures with its feeler scanning the square which is fixed on the clamping surface of the table. Move the table upwards and downwards and note the readings.

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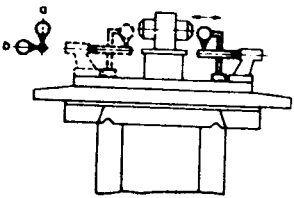
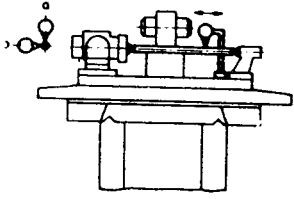
TEST CHART FOR UNIVERSAL TOOL AND CUTTER GRINDER — *Contd*

Sl. No.	TEST	FIGURE	MEASURING INSTRUMENTS	PERMISSIBLE ERROR IN mm	ACTUAL ERROR IN mm	INSTRUCTIONS FOR TESTING
(1)	(2)	(3)	(4)	(5)	(6)	(7)
7	True running of the work head spindle taper		Test mandrel 100 mm long, dial indicator	0.01, maximum amount by which the mandrel runs out	...	Mandrel mounted in the taper of the spindle, indicator mounted on the table with its feeler scanning the periphery of the mandrel. Mandrel rotated slowly and readings noted.
8	Axial slip of the work head spindle		Dial indicator, ball	0.01	...	Ball placed in the spindle centre and indicator set on the ball. The spindle rotated slowly under axial pressure and readings noted.

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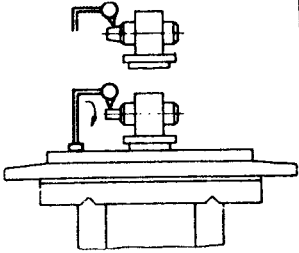
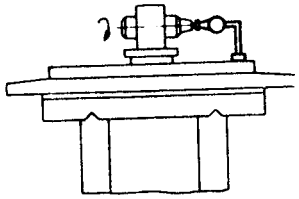
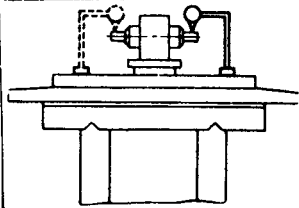
TEST CHART FOR UNIVERSAL TOOL AND CUTTER GRINDER — Contd

IS 3080 : 1965

Sl. No.	TEST	FIGURE	MEASURING INSTRUMENTS	PERMISSIBLE ERROR IN mm	ACTUAL ERROR IN mm	INSTRUCTIONS FOR TESTING
(1)	(2)	(3)	(4)	(5)	(6)	(7)
9	Axis of the tail stock spindle parallel with the longitudinal movement of the table: a) In vertical plane b) In horizontal plane		Test mandrel, dial indicator	0.01/100 mm travel	...	Test mandrel held in tail stock spindle and dial indicator mounted on the table with its feeler scanning the mandrel. Dial indicator moved in both directions and readings noted in horizontal and vertical planes.
10	Tail stock axis in line with work head axis: a) In vertical plane b) In horizontal plane		Test mandrel, dial indicator	a) 0.02 b) 0.02	...	Test mandrel held between centres of work head and tail stock and dial indicator mounted on the table with its feeler scanning the mandrel. Dial indicator moved in both directions and readings noted in horizontal and vertical planes.

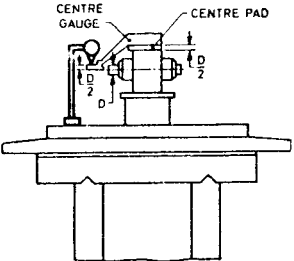
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TEST CHART FOR UNIVERSAL TOOL AND CUTTER GRINDER — Contd

Sl. No.	TEST	FIGURE	MEASURING INSTRUMENTS	PERMISSIBLE ERROR IN mm	ACTUAL ERROR IN mm	INSTRUCTIONS FOR TESTING
(1)	(2)	(3)	(4)	(5)	(6)	(7)
11	True running of grinding wheel spindle		Dial indicator	0.01	...	Dial indicator mounted on the table with its feeler scanning the taper or cylindrical portion of the spindle. Spindle rotated slowly and readings noted.
12	Axial slip of the grinding wheel spindle		Dial indicator, ball	0.01	...	Ball placed in the spindle centre and indicator set on the ball. The spindle rotated slowly and readings noted.
13	Grinding wheel spindle at equal height from the clamping surface		Dial indicator	0.02/300 mm	...	Dial indicator mounted on the clamping surface with its feeler scanning the spindle periphery and readings noted.

(Continued)

TEST CHART FOR UNIVERSAL TOOL AND CUTTER GRINDER — Contd

Sl. No.	TEST	FIGURE	MEASURING INSTRUMENTS	PERMISSIBLE ERROR IN mm	ACTUAL ERROR IN mm	INSTRUCTIONS FOR TESTING
(1)	(2)	(3)	(4)	(5)	(6)	(7)
14	Coincidence of distance of reference surface of centring gauge and grinding spindle		Test mandrel, dial indicator, centre pad and centre gauge	0.1	...	Short cylindrical mandrel having diameter D and taper shank placed in the taper hole of grinding head. (If grinding head spindle is provided with external taper, the gauging ring of diameter D is mounted on the spindle taper.) Centring gauge placed on the centre pad of thickness $D/2$ which rests on the upper surface of grinding head. Dial indicator mounted on the table surface with its feeler scanning alternately the cylindrical surface of mandrel and reference surface of centring gauge and readings noted.

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